Fizyka Procesów Klimatycznych
IPCC

prof. dr hab. Szymon Malinowski
Instytut Geofizyki, Wydział Fizyki
Uniwersytet Warszawski
malina@igf.fuw.edu.pl

dr hab. Krzysztof Markowicz
Instytut Geofizyki, Wydział Fizyki
Uniwersytet Warszawski
kmark@igf.fuw.edu.pl

Wykorzystano slajdy dr Aleksandry Kardaś

Reports

The IPCC prepares comprehensive Assessment Reports about knowledge on climate change, its causes, potential impacts and response options. The IPCC also produces Special Reports, which are an assessment on a specific issue and Methodology Reports, which provide practical guidelines for the preparation of greenhouse gas inventories.

Trochę historii:

Pierwszy raport dla polityków w którym pokazano niebezpieczeństwa związane z z globalnym ociepleniem powodowanym rosnącą emisją CO2 ze spalania paliw kopalnych.

RESTORING THE QUALITY OF OUR ENVIRONMENT

Report of The
Environmental Pollution Panel
President's Science Advisory Committee

THE WHITE HOUSE
NOVEMBER 1965

Subpanel Reports

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APPENDIX Y4

Atmospheric Carbon Dioxide

ROGER REVELLE, *Chairman*

WALLACE BROECKER
HARMON CRAIG
C. D. KEELING
J. SMAGORINSKY

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Nastepny duzy krytyczny raport, „Raport Charneya”

Carbon Dioxide and Climate: A Scientific Assessment

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John G. Dardis, Department of State
Edward Epstein, National Climate Program Office, National Oceanic and Atmospheric Administration

Report of an Ad Hoc Study Group on Carbon Dioxide and Climate
Woods Hole, Massachusetts
July 23–27, 1979
to the
Climate Research Board
Assembly of Mathematical and Physical Sciences
National Research Council

We have examined the principal attempts to simulate the effects of increased atmospheric CO_2 on climate. In doing so, we have limited our considerations to the direct climatic effects of steadily rising atmospheric concentrations of CO_2 and have assumed a rate of CO_2 increase that would lead to a doubling of airborne concentrations by some time in the first half of the twenty-first century.

When it is assumed that the CO_2 content of the atmosphere is doubled and statistical thermal equilibrium is achieved, the more realistic of the modeling efforts predict a global surface warming of between 2°C and 3.5°C, with greater increases at high latitudes. This range reflects both uncertainties in physical understanding and inaccuracies arising from the need to reduce the mathematical problem to one that can be handled by even the fastest available electronic computers. It is significant, however, that none of the model calculations predicts negligible warming.

The primary effect of an increase of CO_2 is to cause more absorption of thermal radiation from the earth's surface and thus to increase the air temperature in the troposphere. A strong positive feedback mechanism is the accompanying increase of moisture, which is an even more powerful absorber of terrestrial radiation. We have examined with care all known negative feedback mechanisms, such as increase in low or middle cloud amount, and have concluded that the oversimplifications and inaccuracies in the models are not likely to have vitiated the principal conclusion that there will be appreciable warming. The known negative feedback mechanisms can reduce the warming, but they do not appear to be so strong as the positive moisture feedback. We estimate the most probable global warming for a doubling of CO_2 to be near 3°C with a probable error of ± 1.5°C. Our estimate is based primarily on our review of a series of calculations with three-dimensional models of the global atmospheric circulation, which is summarized in Chapter 4. We have also reviewed simpler models that appear to contain the main physical factors. These give qualitatively similar results.

To summarize, we have tried but have been unable to find any overlooked or underestimated physical effects that could reduce the currently estimated global warmings due to a doubling of atmospheric CO_2 to negligible proportions or reverse them altogether. However, we believe it quite possible that the capacity of the intermediate waters of the oceans to absorb heat could delay the estimated warming by several decades. It appears that the warming will eventually occur, and the associated regional climatic changes so important to the assessment of socioeconomic consequences may well be significant, but unfortunately the latter cannot yet be adequately projected.

Ten raport odbił się szerokim echem w społeczności międzynarodowej
Jego skutkiem było polowanie przez ONZ z inicjatywy amerykańskiej
Międzyrządowego Panelu do sprawy Zmiany Klimatu (IPCC).

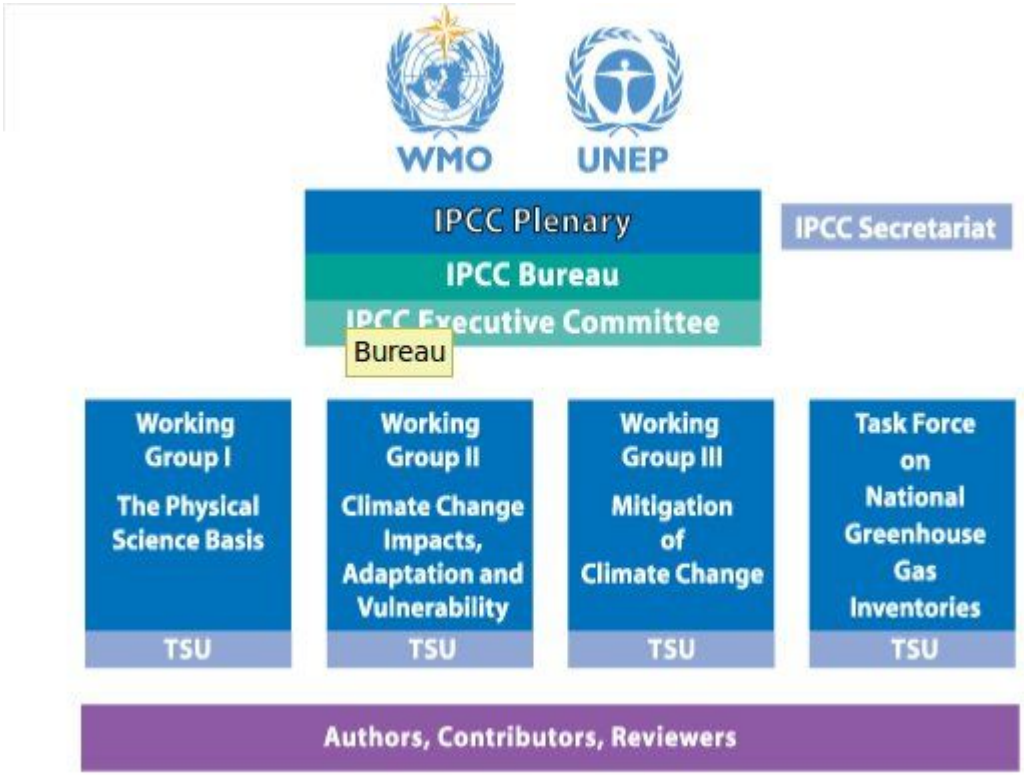
Intergovernmental Panel on Climate Change

Międzyrządowy Zespół ds. Zmian Klimatu

– organizacja założona w 1988 przez dwie organizacje Narodów Zjednoczonych:
Światową Organizację Meteorologiczną (WMO) oraz Program Środowiskowy Organizacji Narodów Zjednoczonych (UNEP) w celu oceny ryzyka związanego z wpływem człowieka na zmianę klimatu. Siedzibą organizacji jest Genewa.

Zadaniem Panelu jest przygotowywanie przeglądów wiedzy na temat przyczyn zmiany klimatu, możliwych skutków przyrodniczych, ekonomicznych i społecznych oraz rekomendacji dotyczących mitygacji zmian oraz adaptacji to tych zmian.

Struktura IPCC



Authors

Hundreds of experts are involved on a voluntary basis in the preparation of IPCC reports. Coordinating Lead Authors and Lead Authors for IPCC reports are selected by the relevant Working Group/Task Force Bureau, under general guidance provided by the Session of the Working Group (or by the Panel in case of reports prepared by the Task Force on National Greenhouse Gas Inventories) from among experts listed by governments and participating organizations, and other experts known through their publications and works.
None of them is paid by the IPCC.

Review Editors

The role of Review Editors in the IPCC assessment process is to assist the Working Group/Task Force Bureaux in identifying reviewers for the expert review process, ensure that all substantive expert and government review comments are afforded appropriate consideration by the author teams, advise Lead Authors on how to handle contentious/controversial issues and ensure genuine controversies are reflected adequately in the text of the report. There will be two to four Review Editors per chapter (including their executive summaries) and per technical summary of any IPCC assessment report.

Expert Reviewers

Expert reviewers review an IPCC draft report either by invitation or at their own request. ... IPCC reports undergo a multi-stage review process. During the first review, First Order Drafts are widely circulated to independent experts all over the world .... and to experts nominated earlier by governments and participating organizations. ….

During the second review by government and experts, Second Order Drafts and a first draft of the Summary for Policymakers will be distributed through the government focal points to all governments, all authors, reviewers involved in the previous expert review and further experts registering for the review. Thousands of scientists from all over the world participate in the IPCC review process as an expert reviewers.

Przykład recenzji jako „expert reviewer”

Working Group I Contribution to the IPCC Fifth Assessment Report

SOD Formal Government Review

Reviewer: Government of Poland

No	Chapter	From Page	From Line	To Page	To Line	Comments
1	7	7	10	7	11	Why “Until”??? This sentence is misleading. Something like: “Clouds consist of droplets and ice crystals resulting from
2	7	7	27	7	28	“…relatively sharp edges and fine scale variations in-cloud properties…” citations should be added. E.g., from recent
3	7	7	54	8	16	Fig.1 should be redrawn. It is unclear and hard to follow.
4	7	9	1	9	4	Brenguier paper focuses on small-scale fluctuations only. There are original experimental (in-situ) papers about wide
5	7	10	51	11	48	For the sake of completeness at the end of this section an information on DNS modeling of cloud properties should be
6	7	31	13	31	13	Seifert et al., 2010 – there are two more papers by (different) Seifert and the others in the reference list
7	7	42	44	42	44	is “acti0vity” should be “activity”
8	7	49	50	50	9	Figure 7.19 summarizes probably the most important result of this chapter an should be elaborated to be more informative.
9	7	12	30	12	37	Figure 7.7 should be updated including information on DNS modeling of cloud processes
10	7	58	31	58	31	Is “as water condenses and releases latent heat” should be “as water condenses, converts into precipitation falling down
11	7	59	47	59	50	is “aerosol-radiation” should be “aerosol – solar radiation” . Some aerosols interact in IR.

More than 830 Authors and Review Editors from over 80 countries were selected to form the Author teams that produced the Fifth Assessment Report (AR5).They in turn drew on the work of over 1,000 Contributing Authors and about 2,000 expert reviewers who provided over 140,000 review comments.

For the Fourth Assessment Report (AR4) released in 2007, over 3,500 experts coming from more than 130 countries contributed to the report (+450 Lead Authors, +800 Contributing Authors, and +2,500 expert reviewers providing over 90,000 review comments).

Scoping

The outline is drafted and developed by experts nominated by governments and observer organizations

Approval of Outline

The Panel then approves the outline

Nomination of authors

Governments and observer organizations nominate experts as authors

Government and Expert Review - 2nd Order Draft

The 2nd draft of the report and 1st draft of the Summary for Policymakers (SPM) is reviewed by governments and experts

Expert Review - 1st Order Draft

Authors prepare a 1st draft which is reviewed by experts

Selection of authors

Bureaux select authors

Final draft report and SPM

Authors prepare final drafts of the report and SPM which are sent to governments

Government review of final draft SPM

Governments review the final draft SPM in preparation for its approval

Approval & acceptance of report

Working Group/Panel approves SPMs and accepts reports

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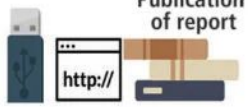
Peer reviewed and internationally available scientific technical and socio-economic literature, manuscripts made available for IPCC review and selected non-peer reviewed literature produced by other relevant institutions including industry



Publication of report

IPCC First Assessment Report 1990 (FAR)

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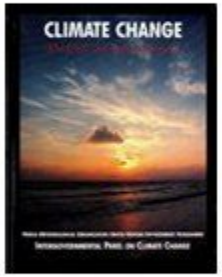
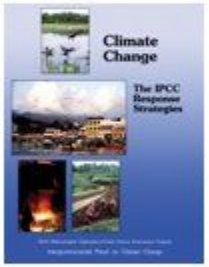


Working Group I:
Scientific Assessment of Climate Change
CLICK HERE

Working Group II:
Impacts Assessment of Climate Change
CLICK HERE



Working Group III:
The IPCC Response Strategies

CLICK HERE

First Assessment Report
Overview Chapter (PDF)
Also in: Chinese - French - Russian - Spanish

1.0.1 *We are certain of the following:*

- There is a natural greenhouse effect which already keeps the Earth warmer than it would otherwise be.

- Emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases: carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxide. These increases will enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface. The main greenhouse gas, water vapour, will increase in response to global warming and further enhance it.

1.0.3 *Based on current model results, we predict:*

- An average rate of increase of global mean temperature during the next century of about 0.3°C per decade (with an uncertainty range of 0.2—0.5°C per decade) assuming the IPCC Scenario A (Business-as-Usual) emissions of greenhouse gases; this is a more rapid increase than seen over the past 10,000 years. This will result in a likely increase in the global mean temperature of about 1°C above the present value by 2025 (about 2°C above that in the pre-industrial period), and 3°C above today's value before the end of the next century (about 4°C above pre-industrial). The rise will not be steady because of other factors.

2. Impacts

2.0.1 The report on impacts of Working Group II is based on the work of a number of subgroups, using independent studies which have used different methodologies. Based on the existing literature, the studies have used several scenarios to assess the potential impacts of climate change. These have the features of:

i) an effective doubling of CO_2 in the atmosphere between now and 2025 to 2050;

ii) a consequent increase of global mean temperature in the range of 1.5°C to 4.5°C;

iii) an unequal global distribution of this temperature increase, namely a smaller increase of half the global mean in the tropical regions and a larger increase of twice the global mean in the polar regions;

iv) a sea-level rise of about 0.3—0.5 m by 2050 and about 1 m by 2100, together with a rise in the temperature of the surface ocean layer of between 0.2° and 2.5°C.

1992 Supplementary Reports

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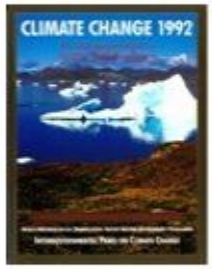

The Supplementary Report to
The IPCC Scientific Assessment

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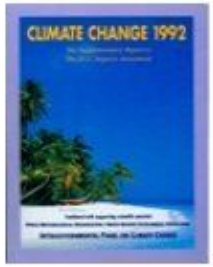

The Supplementary Report to
The IPCC Impacts Assessment

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The IPCC 1990 and
1992 Assessments

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IPCC Second Assessment Report: Climate Change 1995 (SAR)

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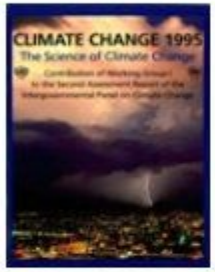
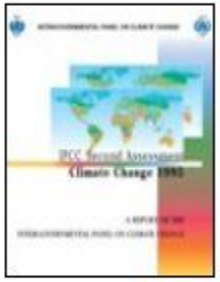


Working Group I:
The Science of Climate Change
Full Report (PDF)

Working Group II:
Impacts, Adaptations and
Mitigation of Climate Change:
Scientific-Technical Analyses
Full Report (PDF)

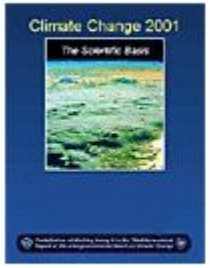
Working Group III:
Economic and Social
Dimensions of Climate Change
Full Report (PDF)



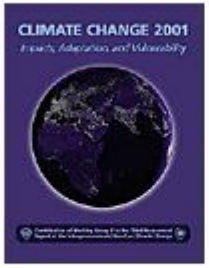
IPCC Second Assessment
Full Report (PDF)
Errata

Arabic - Chinese - French-
Russian - Spanish

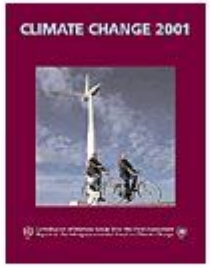
IPCC Third Assessment Report: Climate Change 2001 (TAR)



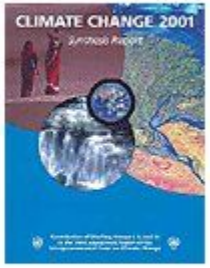
Working Group I:
The Scientific Basis



Working Group II:
Impacts, Adaptation and
Vulnerability



Working Group III:
Mitigation



Synthesis Report

WG1 - Summary for Policymakers

The Third Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC) builds upon past assessments and incorporates new results from the past five years of research on climate change[1]. Many hundreds of scientists[2] from many countries participated in its preparation and review.

This Summary for Policymakers (SPM), which was approved by IPCC member governments in Shanghai in January 2001[3], describes the current state of understanding of the climate system and provides estimates of its projected future evolution and their uncertainties. Further details can be found in the underlying report, and the appended Source Information provides cross references to the report's chapters.

An increasing body of observations gives a collective picture of a warming world and other changes in the climate system.

Since the release of the Second Assessment Report (SAR[4]), additional data from new studies of current and palaeoclimates, improved analysis of data sets, more rigorous evaluation of their quality, and comparisons among data from different sources have led to greater understanding of climate change.

The global average surface temperature has increased over the 20th century by about 0.6°C.

- The global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been 0.6 ± 0.2°C[5], [6] (Figure 1a). This value is about 0.15°C larger than that estimated by the SAR for the period up to 1994, owing to the relatively high temperatures of the additional years (1995 to 2000) and improved methods of processing the data. These numbers take into account various adjustments, including urban heat island effects. The record shows a great deal of variability; for example, most of the warming occurred during the 20th century, during two periods, 1910 to 1945 and 1976 to 2000.
- Globally, it is very likely[7] that the 1990s was the warmest decade and 1998 the warmest year in the instrumental record, since 1861 (see Figure 1a).
- New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the 20th century is likely[7] to have been the largest of any century during the past 1,000 years. It is also likely[7] that, in the Northern Hemisphere, the 1990s was the warmest decade and 1998 the warmest year (Figure 1b). Because less data are available, less is known about annual averages prior to 1,000 years before present and for conditions prevailing in most of the Southern Hemisphere prior to 1861.
- On average, between 1950 and 1993, night-time daily minimum air temperatures over land increased by about 0.2°C per decade. This is about twice the rate of increase in daytime daily maximum air temperatures (0.1°C per decade). This has lengthened the freeze-free season in many mid- and high latitude regions. The increase in sea surface temperature over this period is about half that of the mean land surface air temperature.

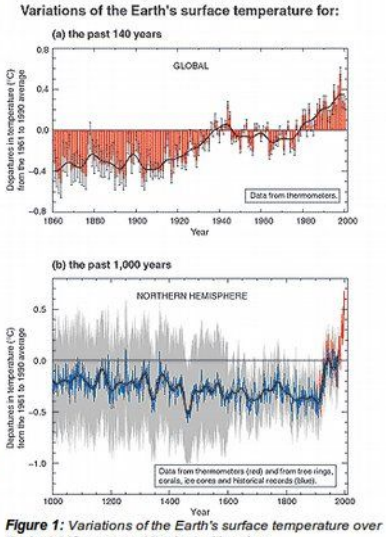
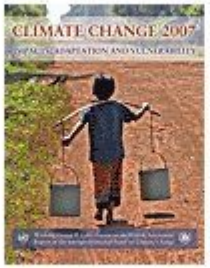


Figure 1: *Variations of the Earth's surface temperature over the last 140 years and the last millennium.*

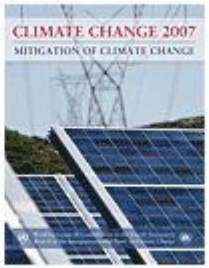
(a) The Earth's surface temperature is shown year by year (red bars) and approximately decade by decade (black line, a filtered annual curve suppressing fluctuations below near decadal

IPCC Fourth Assessment Report: Climate Change 2007 (AR4)

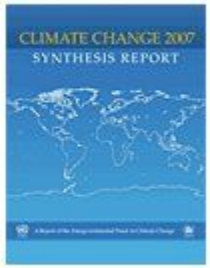
Working Group I Report
"The Physical Science Basis"



Working Group II Report
"Impacts, Adaptation and Vulnerability"



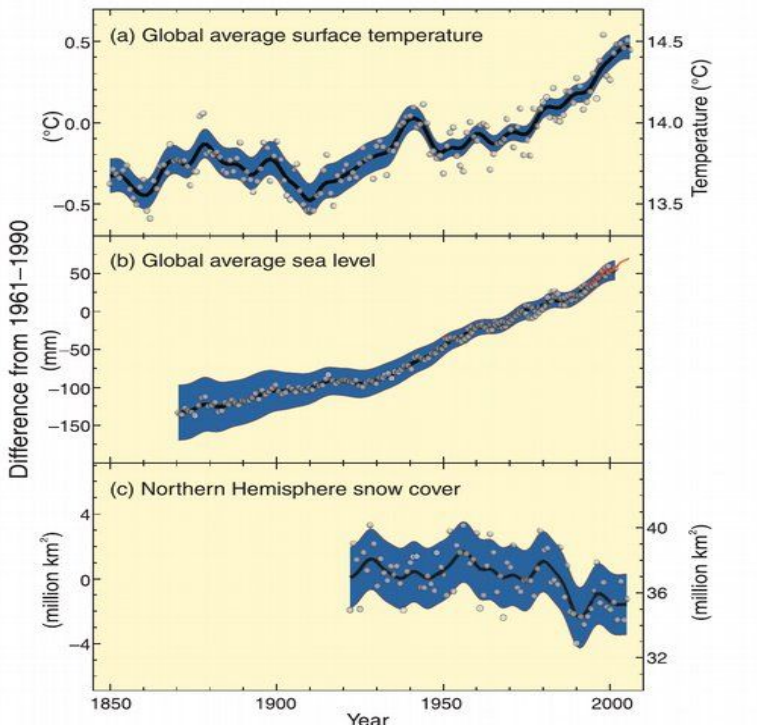
Working Group III Report
"Mitigation of Climate Change"



The AR4 Synthesis Report

1. Observed changes in climate and their effects

Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level (Figure SPM.1). ***{1.1}***



IPCC Fifth Assessment Report

Working Group I Report "Climate Change 2013: The Physical Science Basis"

Working Group II Report "Climate Change 2014: Impacts, Adaptation, and

Working Group III Report "Climate Change 2014: Mitigation of Climate Change"

"Climate Change 2014: Synthesis Report"

SPM 1. Observed Changes and their Causes

Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems. *{1}*

SPM 1.1 Observed changes in the climate system

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. *{1.1}*

ipcc

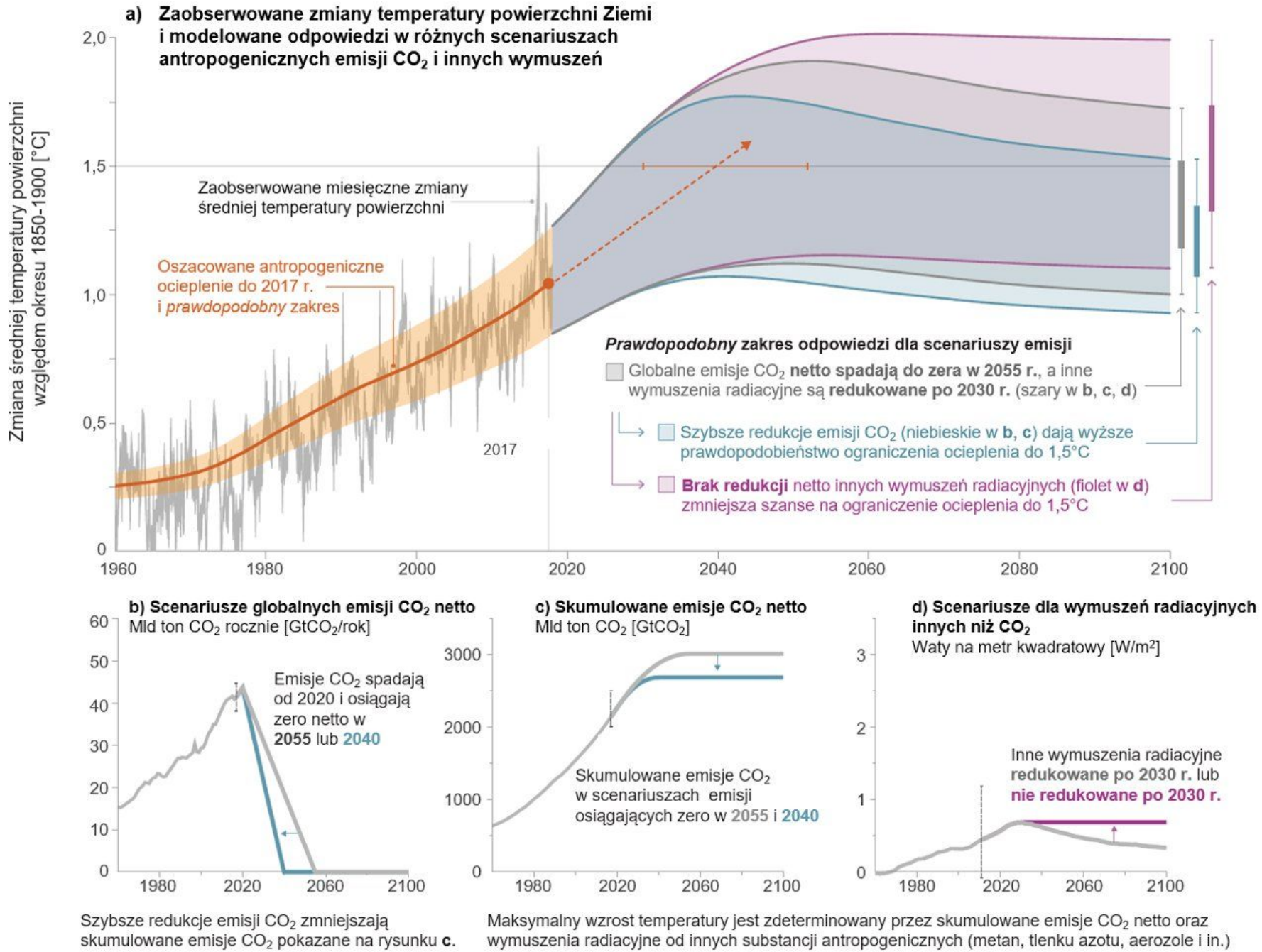
INTERGOVERNMENTAL PANEL ON climate change

Globalne ocieplenie klimatu o 1,5°C

Specjalny Raport IPCC dotyczący następstw globalnego ocieplenia klimatu o 1,5°C ponad poziom sprzed epoki przemysłowej oraz związanych z tym globalnych scenariuszy emisji gazów cieplarnianych, w kontekście wzmacniania odpowiedzi globalnej na zagrożenie zmianą klimatu, wspierania zrównoważonego rozwoju oraz działań na rzecz wyeliminowania ubóstwa.

Podsumowanie dla Decydentów

Skumulowane emisje CO_2 i inne przyszłe wymuszenia radiacyjne zdeterminują szanse na ograniczenie ocieplenia do 1,5°C



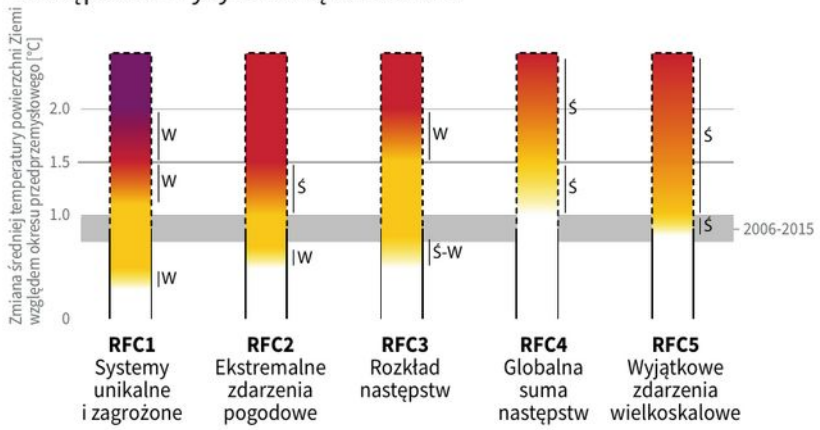
Szybsze redukcje emisji CO_2 zmniejszają skumulowane emisje CO_2 pokazane na rysunku **c**.

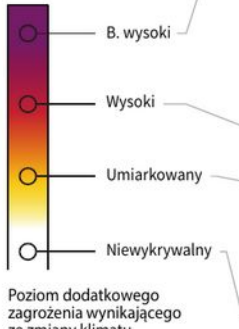
Maksymalny wzrost temperatury jest zdeterminowany przez skumulowane emisje CO_2 netto oraz wymuszenia radiacyjne od innych substancji antropogenicznych (metan, tlenku azotu, aerozole i in.)

Jak wielkość globalnego ocieplenia wpływa na skutki i/lub poziom zagrożeń w wybranych domenach (ang. *Reasons for Concern*, RFC) oraz wybrane systemy antropogeniczne i ekosystemy.

Pięć sfer zagrożeń (RFC) ilustruje następstwa i ryzyka związane z różnym poziomem globalnego ocieplenia dla systemów antropogenicznych i środowiska naturalnego w różnych sektorach i regionach.

Następstwa i ryzyka związane z RFC





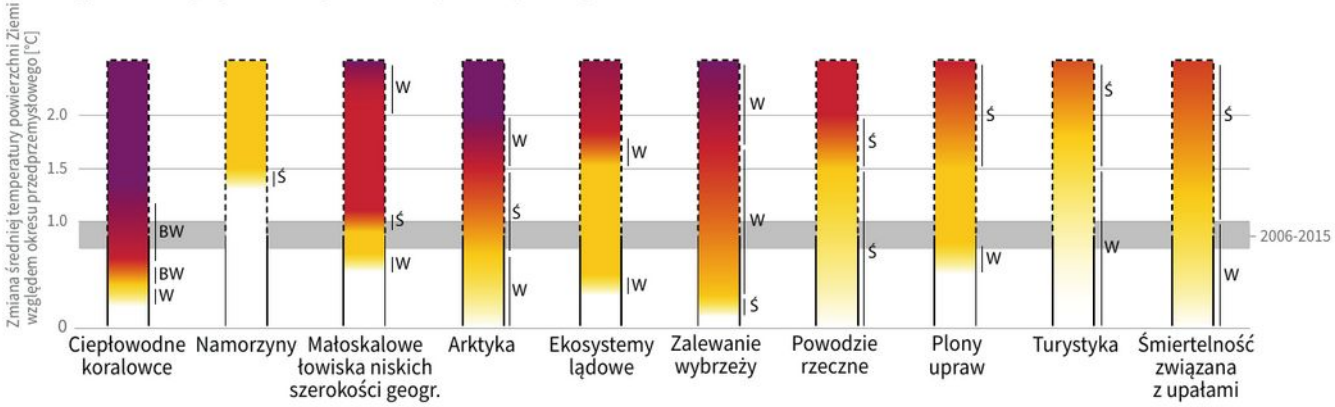
Kolor fioletowy wskazuje na bardzo wysokie ryzyko poważnych następstw/ryzyk oraz istnienie nieodwracalności lub utrzymujących się zagrożeń klimatycznych, których charakter ogranicza możliwości adaptacji.

Kolor czerwony wskazuje na poważne i powszechne następstwa/ryzyka

Kolor żółty wskazuje na zauważalne następstwa/zagrożenia, wiązane ze zmianą klimatu z co najmniej średnim stopniem pewności.

Kolor biały wskazuje na brak zauważalnych następstw związanych ze zmianą klimatu.

Następstwa i ryzyka związane z **wybranymi systemami**

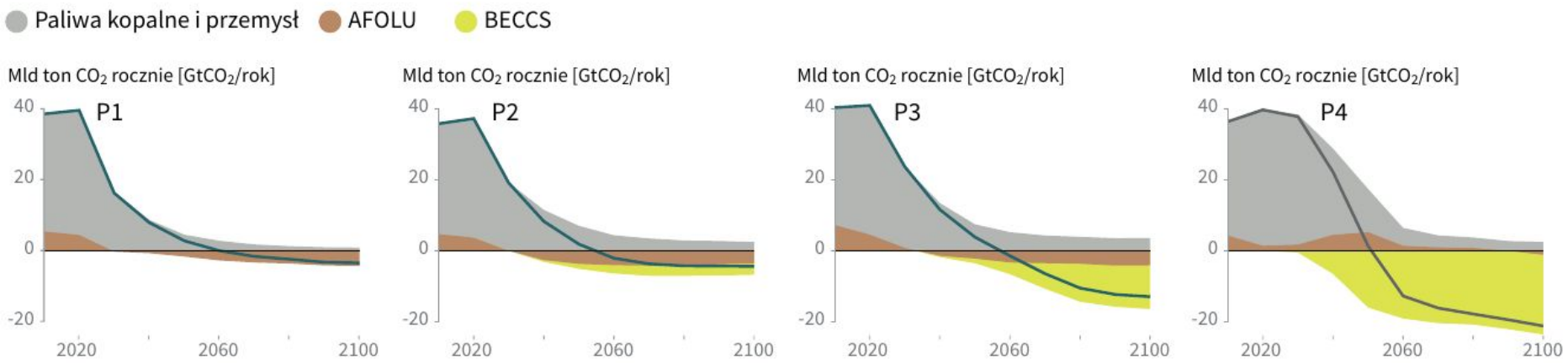


Stopień pewności: N=niski, Ś=średni, W=Wysoki, BW=Bardzo wysoki

Charakterystyka czterech przykładowych scenariuszy modelowych

Redukcje emisji netto, niezbędne dla ograniczenia ocieplenia do 1,5° bez przekroczenia tego progu lub z jego niewielkim przekroczeniem, mogą zostać osiągnięte za pośrednictwem różnych strategii mitygacyjnych. We wszystkich scenariuszach wykorzystane są technologie usuwania dwutlenku węgla (ang. *Carbon Dioxide Removal*, CDR), jednak ich skala różni się między scenariuszami, podobnie jak wkład bioenergii z wychwytem i sekwestracją dwutlenku węgla (ang. *Bioenergy with Carbon Capture and Storage*, BECCS) i pochłanianie w sektorach rolnictwa, leśnictwa i innego użytkowania terenu (ang. *Agriculture, Forestry and Other Land Use*, AFOLU). Ma to implikacje dla emisji i innych charakterystyk scenariuszy

Udziały poszczególnych składowych w globalnych emisjach CO_2 netto dla czterech przykładowych scenariuszy



P1: Scenariusz, w którym społeczne, biznesowe i technologiczne innowacje skutkują spadkiem zapotrzebowania na energię w 2050 roku przy jednoczesnej poprawie standardu życia, szczególnie na Globalnym Południu. Mniejszy system energetyczny pozwala na szybką dekarbonizację wytwarzania energii. Zalesianie jest jedyną wykorzystywaną opcją CDR, technologie CCS i BECCS nie są stosowane.

P2: Scenariusz, skupiający się na zrównoważonym rozwoju, w tym m.in. efektywności energetycznej, rozwoju społecznym, konwergencji gospodarczej i współpracy międzynarodowej, a także zwrocie w kierunku zrównoważonych i zdrowych wzorców konsumpcji, niskowęglowych innowacji technologicznych i dobrego zarządzania terenem, przy ograniczonej akceptacji społecznej dla BECCS.

P3: Pośredni scenariusz, w którym rozwój społeczny i technologiczny przebiega zgodnie z trendami historycznymi. Redukcje emisji osiąga się głównie przez zmianę sposobu wytwarzania energii i produktów, a w mniejszym stopniu przez zmniejszenie popytu.

P4: Scenariusz intensywnego zużywania zasobów i energii, w którym wzrost gospodarczy i globalizacja prowadzą do powszechnego przyjęcia wysokoemisyjnego stylu życia, wliczając w to wysokie zapotrzebowanie na paliwa transportowe i mięso. Redukcje emisji osiąga się głównie dzięki zmianom w technologiach, przy silnym poleganiu na CDR, głównie BECCS.

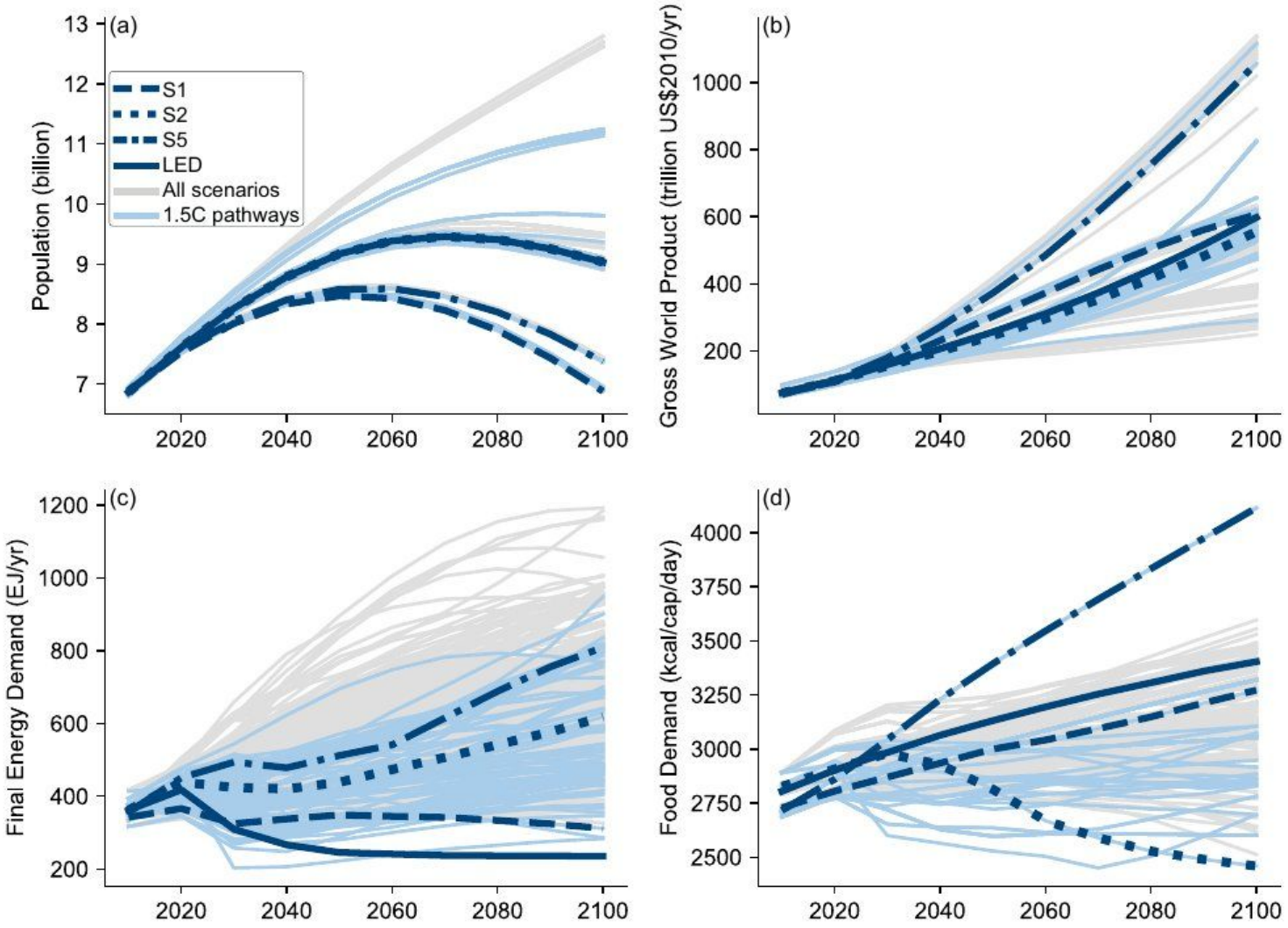
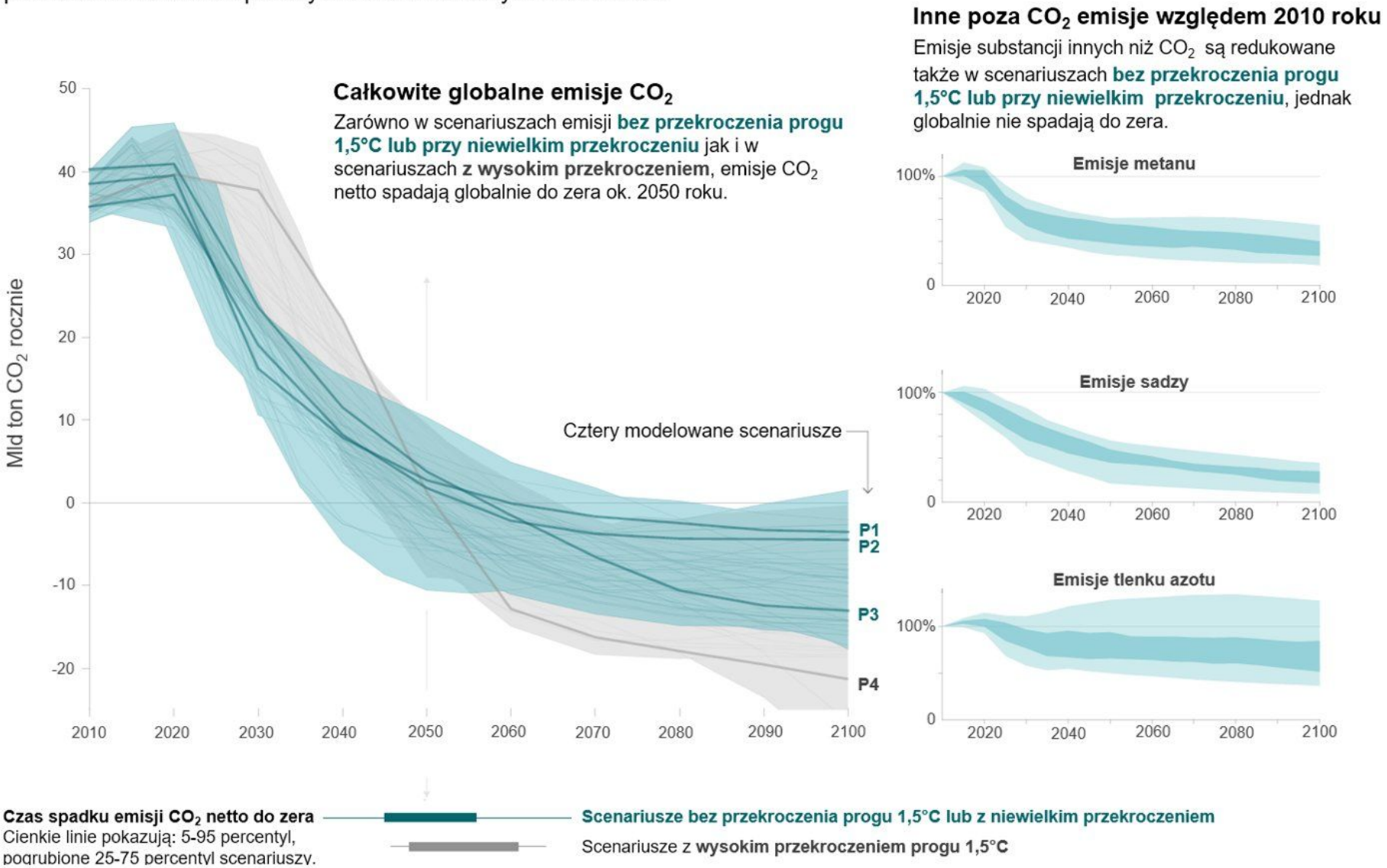


Figure 2.4 | Range of assumptions about socio-economic drivers and projections for energy and food demand in the pathways available to this assessment. 1.5°C-consistent pathways are blue, other pathways grey. Trajectories for the illustrative 1.5°C-consistent archetypes used in this Chapter (LED, S1, S2, S5; referred to as P1, P2, P3, and P4 in the Summary for Policymakers.) are highlighted. S1 is a sustainability oriented scenario, S2 is a middle-of-the-road scenario, and S5 is a fossil-fuel intensive and high energy demand scenario. LED is a scenario with particularly low energy demand. Population assumptions in S2 and LED are identical. Panels show (a) world population, (b) gross world product in purchasing power parity values, (c) final energy demand, and (d) food demand.

Globalne scenariusze emisji

Ogólna charakterystyka zmian antropogenicznych emisji CO_2 netto oraz emisji metanu, sadzy i tlenku azotu w scenariuszach emisji pozwalających na ograniczenie globalnego ocieplenia o 1,5°C bez przekroczenia tego progu lub z jego niewielkim przekroczeniem. Emisje netto definiowane są jako antropogeniczne emisje pomniejszone o antropogeniczne usuwanie. Redukcja emisji netto może być prowadzona na różne sposoby zilustrowane na rysunku SPM3B.



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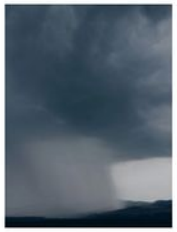

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Authors: UNEP, UNEP Copenhagen Climate Centre (UNEP-CCC)

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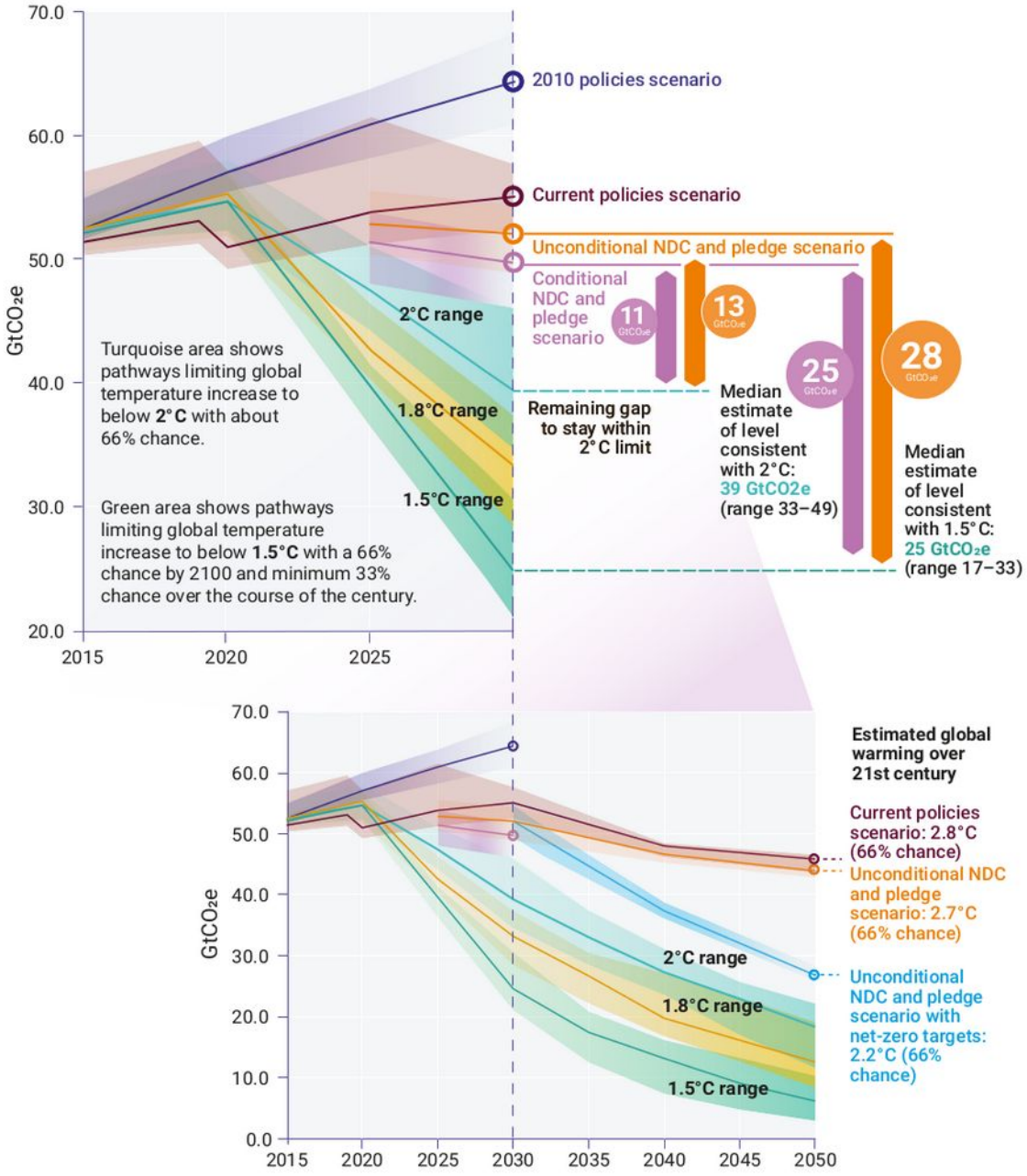
70.0
60.0
50.0
40.0
30.0
20.0
GtCO2e
2015
2020
2025
2010 policies scenario
Current policies scenario
Unconditional NDC and pledge scenario
Conditional NDC and pledge scenario
11
13
25
28
2°C range
1.8°C range
1.5°C range
Turquoise area shows pathways limiting global temperature increase to below 2°C with about 66% chance.
Green area shows pathways limiting global temperature increase to below 1.5°C with a 66% chance by 2100 and minimum 33% chance over the course of the century.
Remaining gap to stay within 2°C limit
Median estimate of level consistent with 2°C: 39 GtCO2e (range 33–49)
Median estimate of level consistent with 1.5°C: 25 GtCO2e (range 17–33)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
GtCO2e
2015
2020
2025
2030
2035
2040
2045
2050
2°C range
1.8°C range
1.5°C range
Estimated global warming over 21st century
Current policies scenario: 2.8°C (66% chance)
Unconditional NDC and pledge scenario: 2.7°C (66% chance)
Unconditional NDC and pledge scenario with net-zero targets: 2.2°C (66% chance)

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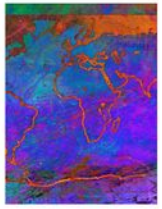

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